

Predictors of Appropriate Defibrillator Therapies – A Single Center Analysis

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INTRODUCTION

- Heart Disease remains the leading cause of death, accounting for 616,067 deaths in 2009 alone
- The most commonly identified arrhythmia in cardiac arrest patients is ventricular fibrillation, up to one third of all cardiovascular mortality
- Implantable cardioverter defibrillators (ICDs) provide proven reduction in sudden cardiac death in patients with life-threatening ventricular tachyarrhythmias
- A significant number of patients however, do not receive appropriate therapy during the first few years after implantation
- While landmark studies have focused on predictors of inappropriate therapies, there has not been as much focus on predictors of appropriate therapy
- This study attempted to identify clinical variables that may be associated with increased likelihood of appropriate ICD therapies

OBJECTIVE

- To identify clinical parameters that may be associated with a higher risk of appropriate ICD therapies (shock or anti-tachycardia pacing for ventricular arrhythmias) in a cohort of patients being remotely monitored with the Medtronic CARELINK system
- To identify clinical predictors of early vs. late ICD shocks in patients with appropriate ICD therapies

METHODS

- A retrospective cohort study was performed on 115 patients who received ICDs for primary and secondary prevention between July 1989 and March 2010
- Single chamber, dual chamber, and biventricular ICDs were included
- Clinical data collected at the time of ICD implantation are shown in the TABLE
- CARELINK follow up data were analyzed to classify the arrhythmia leading to the ICD therapy
- All ICD therapies (ATP or shocks) were adjudicated as appropriate or inappropriate by two authors
- Patients were then divided into two groups: those with and without appropriate ICD therapies
- Patients who received appropriate therapies were divided into two groups: early (< 2 yrs) vs. late (> 2 yrs)
- Two tailed independent Student's *t*-test was performed on continuous variables, and Fisher's exact test was performed on dichotomous variables

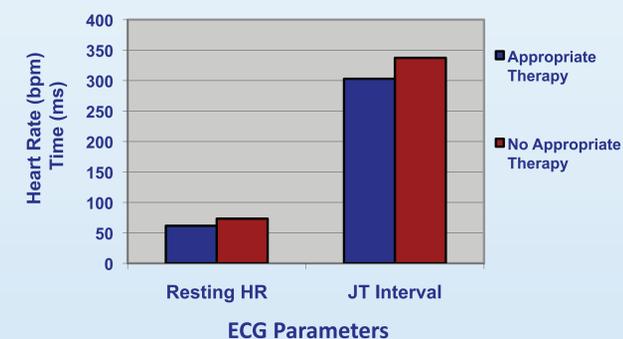
RESULTS (TABLE)

- Only ECG resting heart rate (61.6 vs. 73.3 bpm) and JT interval (337.3 vs. 302.9 ms) were statistically different between the two groups
- Among the 34 patients who received appropriate therapies, none of the variables studied were significantly different in patients who had early vs. late ICD shocks
- **We were unable to identify any clinical, ECG, or laboratory variables that were associated with increased risk of appropriate ICD shock**

DATA

Variable	No Appropriate Therapy (n=81)	Appropriate Therapy (n=34)	P Value
Age at ICD Implant (yrs)	61.60	62.03	NS
Gender (% Male)	60 (74.1%)	30 (88.2%)	NS
ICD Indication (% Primary Prevention)	55 (67.9%)	16 (47.1%)	0.060
Prior CABG	29 (35.8%)	11 (32.4%)	NS
Former or Current Smoker	37 (45.7%)	12 (35.3%)	NS
Cardiomyopathy (% Coronary Artery Disease)	41 (50.6%)	23 (67.6%)	0.10
Left Ventricular Ejection Fraction	0.33	0.36	NS
Systolic vs. Diastolic CHF	57 (70.4%)	19 (55.9%)	NS
Heart Failure > NYHA Class 1	59 (72.8%)	19 (55.9%)	NS
Heart Failure > NYHA Class 3	16 (19.8%)	3 (8.8%)	NS
Chronic Atrial Fibrillation	7 (8.6%)	3 (8.8%)	NS
Hypertension	44 (54.3%)	18 (52.9%)	NS
Diabetes Mellitus	23 (28.4%)	4 (11.8%)	NS
Prior CVA/TIA	8 (9.9%)	2 (5.9%)	NS
COPD	6 (7.4%)	1 (2.9%)	NS
Malignancy	11 (13.6%)	4 (11.8%)	NS
S. Creatinine (mg/dl)	1.16	1.24	NS
Creatinine Clearance	87.55	77.77	NS
S. Albumin	3.89	3.74	NS
Anemia at Implant (Hg <11)	19 (23.5%)	4 (11.8%)	NS
Amiodarone Use	11 (13.6%)	10 (29.4%)	0.058
Beta Blocker Use	73 (90.1%)	26 (76.5%)	NS
Mean Duration of Follow Up (yrs)	4.8	5.3	NS
ECG Parameters			
HR (bpm)	73.3	61.6	0.004
QRS Duration (ms)	124.6	134.6	NS
QT Interval (ms)	461.3	443.4	NS
JT Interval (ms)	337.3	302.9	0.006
QRS Axis (degrees)	31.9	6.36	NS

ECG Differences Between Appropriate & Inappropriate ICD Therapies



DISCUSSION

- Although differences in HR and the JT interval were statistically significant in patients who received appropriate shock vs. those who did not, these differences are not clinically meaningful
- We did not identify any clinical predictors of early vs. late ICD shocks
- **These data suggest that we may not be able to improve on current guidelines for patient selection for ICD implantation**